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SHORT COMMUNICATION

Notes on two coelotine spiders from Japan (Araneae: Agelenidae)

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Abstract. Two spider species of the subfamily Coelotinae from Japan, *Coelotes decolor* Nishikawa 1973 and *Hypocoelotes tumidivulva* (Nishikawa 1980), are revised. We focus particularly on the female vulva structures, which are illustrated and described for the first time. Both species have unique genitalic structures compared with other coelotines. The female *Coelotes decolor* is similar to *C. akakinaensis* Shimojana 2000 and *C. iheyaensis* Shimojana 2000 in having long spermathecal stalks, but no species have been found to be similar to *Hypocoelotes tumidivulva*.

Keywords: *Coelotes*, *Hypocoelotes*, morphology, vulva

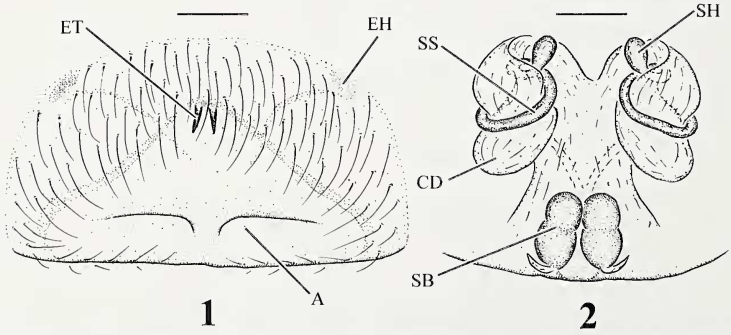
Coelotine spiders have similar somatic appearances but rather diversified genitalic structures. In most cases, the ventral view of the epigynum will provide enough information to identify the female, but the dorsal, or inside, view of epigynum, which reveals the vulva tubes, could not only help researchers identify the species, but also could serve as an important estimation of their phylogenetic relationships within the subfamily Coelotinae F.O. Pickard-Cambridge 1893. The structures observed in dorsal view of the epigynum in coelotines include the fertilization ducts, copulatory ducts, and spermathecae. The fertilization ducts are consistently short and slender, arising from proximal spermathecae, but copulatory ducts and spermathecae vary among coelotine species.

Two ceolotines featured in publications by Nishikawa separately in 1973 and 1980 from Japan showed distinctly different epigyna in ventral view: *Coelotes decolor* Nishikawa 1973 and *Coelotes tumidivulva* Nishikawa 1980. Unfortunately, the vulva structures were neither described nor illustrated in either species. Since then several studies have been made (Nishikawa 1974, 1987, 2009; Shinkai 1978; Yaginuma 1986; Chikuni 1989; Okumura et al. 2009), and a new genus, *Hypocoelotes* Nishikawa 2009, has been proposed to accommodate *Coelotes tumidivulva*, but regrettably no vulva structures were explored in these studies.

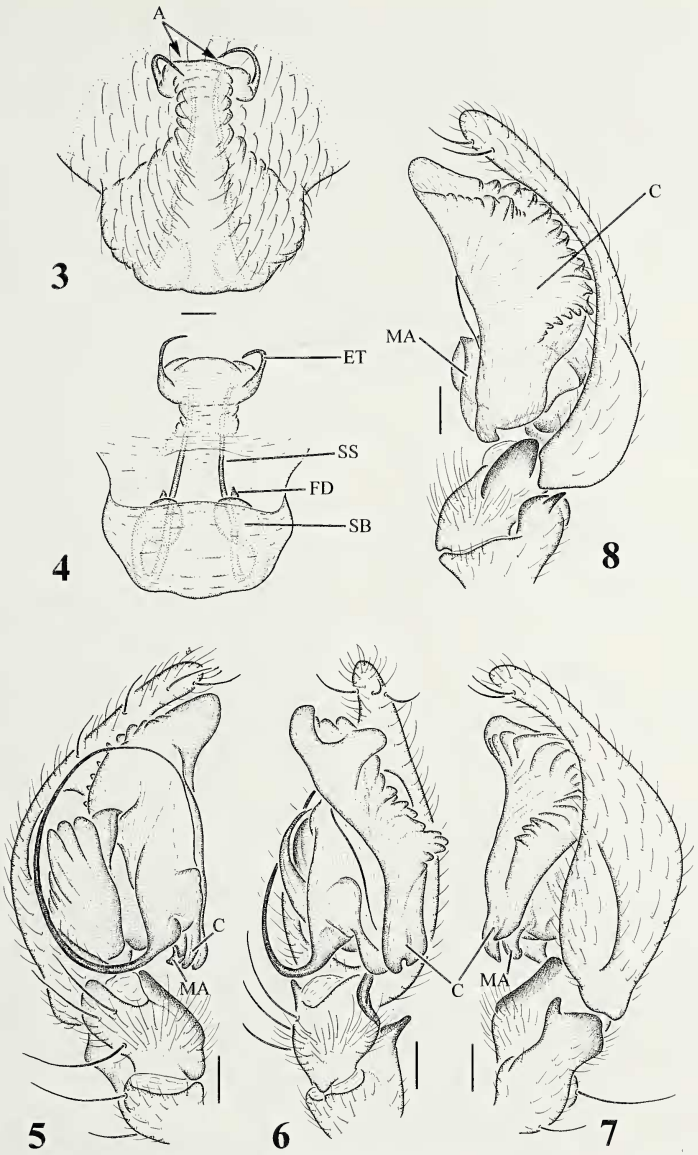
In this paper, we explored the details of the vulva of both species and found that they have distinctly different structures. In addition to the epigynum, the male palp of *Hypocoelotes tumidivulvus* (Nishikawa 1980) was also re-illustrated to reveal the details, which are missing in previous studies.

Abbreviations used in the text are: *Eyes*: AME–anterior median eyes; ALE–anterior lateral eyes; PLE–posterior lateral eyes; PME–posterior median eyes. *Epigynum*: A–atrium; CD–copulatory duct; EH–epigynal hood; ET–epigynal tooth; FD–fertilization duct; S–spermathecae; SB–spermathecal base; SS–spermathecal stalk; SH–spermathecal head. *Palp*: C–conductor; MA–median apophysis; RTA–retrolateral tibial apophysis.

The material examined in the current paper is deposited in the National Museum of Nature and Science (former National Science Museum), Tokyo (NSMT). Scale lines = 0.2 mm. Terminology used in the text and figures follows Wang (2002). The distribution map was created using ArcView GIS software, and distribution data are collected from Nishikawa (1973, 1987). In this study we follow Miller



Figures 1, 2.—*Coelotes decolor* Nishikawa 1973, female from Goto Islands, Japan, epigynum. 1. Ventral view; 2. Dorsal view.



Figures 3–8.—*Hypocoelotes tumidivulva* (Nishikawa 1980), female from Gifu, Japan. 3. Epigynum, ventral view; 4. Epigynum, dorsal view; 5. Palp, prolateral view; 6. Palp, ventral view; 7–8. Palp, retrolateral view.

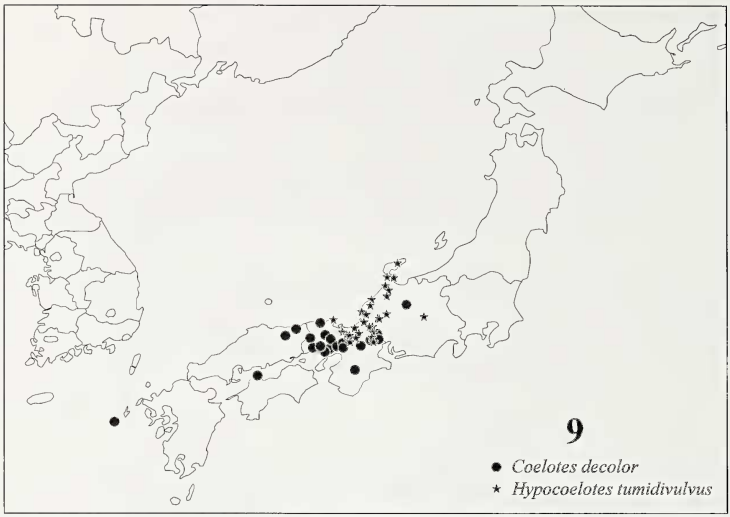


Figure 9. Map of Japan, showing the distribution records of *Coelotes decolor* Nishikawa 1973 (dark circle) and *Hypocoelotes tumidivulva* (Nishikawa 1980) (dark star). Data from Nishikawa (1973, 1987).

et al. (2010) and list Coelotinae as a subfamily of the family Agelenidae, rather than Amaurobiidae.

TAXONOMY

Agelenidae C.L. Koch 1837
Coelotinae F.O. Pickard-Cambridge 1893

Coelotes Blackwall 1841
Coelotes decolor Nishikawa 1973
(Figs. 1, 2, 9)

Coelotes decolor Nishikawa 1973:75, figs. 1–5 (female holotype and male paratype from Hyogo Prefecture, Japan, in the Arachnological Society of Japan, c/o Otemon Gakuin University, Ibaraki, Osaka, not examined); Nishikawa 1974:178, figs. 27, 28; Nishikawa 1976:1056, fig. 11; Shinkai 1978:95, figs. 33, 34; Yaginuma 1986:151, fig. 82.9; Chikuni 1989:102, fig. 17; Okumura et al. 2009:187, figs. 183–187.

Material examined.—JAPAN: *Nagasaki Prefecture*: Gotō Islands, Fukue-jima, Tomie-cho, Takego, No-ana Cave, October 4, 1970, 1♀ S.-I. Uéno leg. (NSMT-Ar 91).

Diagnosis.—The female is similar to *C. akakinaensis* Shimojana 2000 and *C. iheyaensis* Shimojana 2000 in having tiny, anteriorly arising, closely set epigynal teeth and long, coiled, anteriorly extending spermathecal stalks, but can be distinguished by the small, posteriorly situated atrium (Figs. 1, 2). The male can be recognized by the broad, short conductor and long, broad embolus (Nishikawa 1973:figs. 3–5; Okumura et al. 2009:figs. 186, 187).

Description.—Described by Nishikawa (1973), but female vulva was neither illustrated nor described.

Female: Medium to large-sized coelotine, total length 8.00–11.00. AME smallest, about half the size of ALE, posterior eyes subequal in size, ¾ size of ALE; anterior eyes equally separated by slightly less than AME diameter; PME separated from each other by about their diameter, from PLE by about 1.2 times PME diameter. Chelicera with 3 promarginal and 2 retromarginal teeth. Labium slightly longer than wide. Epigynal teeth tiny, arising anteriorly at level of epigynal hoods, closely set, distinctly separated from atrium by 2–3 times atrial length; atrium wider than long, situated posteriorly close to epigastric furrow, with distinct posteriorly protruding anterior margin, lateral margins indistinct; copulatory ducts large, originating posteriorly, closely set, extending medially and anteriorly, then diverging and extending laterally and posteriorly, forming two large sacs around which the spermathecal stalks coil; spermathecae with bases broad, closely set, slightly extending anteriorly; spermathecal stalks long, slender, arising close together from anterior part of spermathecal bases, diverging and coiling around anterior part of copulatory ducts; spermathecal heads large, arising anteriorly (Figs. 1, 2).

Male: Medium sized coelotine, total length 8.00–9.50. Chelicera with 3 promarginal and 2 retromarginal teeth. Palp with a small patellar apophysis; RTA more than half of tibial length, with slightly protruding distal end; lateral tibial apophysis, which is a small apophysis arising from dorsal side of RTA in most coelotines (Wang 2003:fig. 2D), present; cymbial furrow less than half of cymbial length; cymbium with 5 distinct trichobothria retrolaterally close to distal cymbial furrow; conductor broad, short, deeply grooved; median apophysis spoon-shaped, not elongate along anterior edge; embolus long, broad, originating between prolateral and proximal, not coiled beyond distal part of bulb (Nishikawa 1973:figs. 3–5; Okumura *et al.* 2009:figs. 186, 187).

Distribution.—Japan (Fig. 9).

Hypocoelotes Nishikawa 2009
Hypocoelotes tumidivulva (Nishikawa 1980)
(Figs. 3–9)

Coelotes tumidivulva Nishikawa 1980:39, figs. 1–12 (female holotype and male allotype from Gifu Prefecture, Japan, in NSMT, examined); Yaginuma 1986:151, fig. 82.11; Nishikawa 1987:443, fig. 106; Chikuni 1989:102, fig. 18.
Coelotes tumidivulvus Platnick 2010.

Hypocoelotes tumidivulva Okumura et al. 2009:178, figs. 46–52 (note: the name *tumidivulva* is a noun and need not agree in gender with the generic name).

Material examined.—JAPAN: *Gifu Prefecture*: east slope of the Nukumi-toge pass, 950 m, north of Mt. Nogo-Hakusan, October 4, 1980, 1♀ (holotype, NSMT-Ar. 420), 1♂ (allotype, NSMT-Ar. 421), Y. Nishikawa.

Diagnosis.—This species can be easily distinguished from other coelotines by the large, posteriorly protruding epigynal plate and slender, anteriorly originating, posteriorly extending spermathecal stalks in the female, and by the broad patellar apophysis, absence of lateral tibial apophysis, absence of conductor dorsal apophysis, broad, posteriorly extending, strongly wrinkled conductor in the male (Figs. 3–8).

Description.—Described by Nishikawa (1980), but female vulva was neither illustrated nor described.

Female: Medium-sized coelotine, total length 6.60 (holotype). AME smallest, less than half the size of ALE, ALE largest; posterior eyes subequal in size, with PLE slightly larger; AME separated from each other by about their diameter, from ALE by slightly less than AME diameter; posterior eyes equally separated by about their diameter. Chelicera with 3 promarginal and 2 retromarginal teeth. Labium length subequal to width. Epigynum with a large, anteriorly narrow and posteriorly broad, distinctly protruding plate; epigynal teeth short, slender, arising anteriorly, moderately separated; atrium reduced to a slit, situated anteriorly close to epigynal teeth; copulatory ducts small, close to epigynal teeth; spermathecae with long, slender stalks arising anteriorly and extending posteriorly to posterior protrusion of epigynal plate, slightly curved back anteriorly to small, round spermathecal bases; spermathecal bases separated by slightly less than their width; spermathecal heads invisible from dorsal view; fertilization ducts small, arising anteriorly on spermathecal bases (Figs. 3, 4).

Male: Medium-sized coelotine, total length 6.10 (allotype). Palp with patellar apophysis as broad as patella, with a small distal tooth; RTA slightly more than half of tibial length, with blunt distal end; lateral tibial apophysis absent; cymbium furrow less than half of cymbial length; conductor broad, long, extending posteriorly to base of embolus, slightly notched and toothed distally, distinctly wrinkled dorsally, without dorsal apophysis and basal lamella; median apophysis small, spoon-shaped, covered by conductor in ventral view; embolus filiform, long, with small base, proximal in origin, not coiled beyond distal part of bulb (Figs. 5–8).

Distribution.—Japan (Fig. 9).

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